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10/568,648	02/16/2006	Eugenio Cantatore	GB030138	4567

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EXAMINER

CRAWLEY, KEITH L

ART UNIT	PAPER NUMBER
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4193

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/568,648	Applicant(s) CANTATORE ET AL.	
	Examiner KEITH CRAWLEY	Art Unit 4193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/16/06; 3/8/07</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

Claim 11 is objected to because of the following informalities: Both a **further plurality of connectors** and the **plurality of connectors** are referred to as element **(132)**. It is assumed in both instances that applicant intended to refer to the **further plurality of connectors** for element (132). Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mach et al. Applied Physics Letters, volume 78, number 23, page 3592-3594 of 2001 (hereinafter "Mach") in view of Crone et al. "Large-scale complementary integrated circuits based on organic transistors", Nature, vol. 403, page 521-523 of 2000 (hereinafter "Crone").

Regarding claims 1-4, Mach discloses a display device, comprising: a flexible substrate (pg. 3592, col. 2, 1st ¶) carrying a matrix array comprising: a plurality of first

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conductors (fig. 1(b), "column" electrodes); a plurality of second conductors (fig. 1(b), "row" electrodes), each of the second conductors crossing the plurality of first conductors (fig. 1(b)); and a plurality of pixels (fig. 1(b)), each pixel being located in the vicinity of a crossing of a first conductor and a second conductor (fig. 1(b)), the pixel comprising an electro-optical element being addressable by the first conductor and the second conductor (fig. 1(a), the electro-optical element is the PDLC), wherein each pixel comprises a switch coupled between the associated second conductor and the electro-optical element (fig 1), the switch comprising an organic semiconductor material (fig. 1(a), see also abstract and pg. 3592, col. 2, 1st ¶) and a control terminal coupled to the associated first conductor (fig. 1).

Mach fails to disclose the display device further comprising: a flexible shift register for addressing the plurality of first conductors, the flexible shift register comprising a plurality of shift register cells, each shift register cell being coupled to one of the first conductors, wherein each shift register cell comprises a plurality of further switches, each further switch comprising a further organic semiconductor material, wherein the shift register is carried by the flexible substrate.

Crone teaches a display device comprising: a flexible shift register for addressing the plurality of first conductors (pg. 522, col.2, shift registers implemented on flexible substrates are discussed), the flexible shift register comprising a plurality of shift register cells (pg. 522, col. 2, "48-stage shift register with 24 output buffers", see also fig. 2(e)), each shift register cell being coupled to one of the first conductors (fig. 4, see also pg. 522, col.2 "shift registers are ubiquitous in digital systems and can perform many

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functions”), wherein each shift register cell comprises a plurality of further switches (fig. 4(b), see also pg. 523, 1st ¶, “four-deep connections”), each further switch comprising a further organic semiconductor material (pg. 523, 1st ¶, “four-deep connections” have been shown to work for organic semiconductors), wherein the shift register is carried by the flexible substrate (complementary logic circuits tested are “convenient for implementation on flexible plastic substrates”, see pg. 522, top of col. 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the flexible shift registers “ubiquitous in digital systems” (pg. 522 col. 2) taught in Crone with the flexible display driven by organic transistors disclosed in Mach, since such a modification would have provided organic circuitry that is reliable and low-cost (Crone, pg. 522 2nd ¶) with simple layouts convenient for implementation on flexible substrates (Crone, pg 522, top of col. 2).

2. Claims 5-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mach and Crone as applied to claims 1-4 above, and further in view of DaCosta et al. (US 6,281,891).

Regarding claim 5, neither Mach nor Crone discloses wherein the shift register is carried by a further flexible substrate, the further flexible substrate being bonded to a first side of the flexible substrate.

DaCosta teaches wherein the shift register is carried by a further flexible substrate (see abstract, fig. 1, see also col. 4, line 65-67, “the substrate with array

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circuitry... can be part of a product that also includes signal input circuitry on another substrate”, see also col. 10, line 47-48, signal input circuitry can include a shift register), the further flexible substrate being bonded to a first side of the flexible substrate (col. 7, line 6-9, using tape-automated-bonding (TAB)). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the further flexible substrate and shift register of DaCosta with the flexible display of Mach and Crone since such a modification would reduce the risk of mechanical failure (DaCosta, col. 5, line 30-31) and allow for a very dense array (DaCosta, col. 5, line 45-46).

Regarding claims 6 and 11, neither Mach nor Crone discloses wherein the shift register comprises a first plurality of connectors for connecting the shift register to external control circuitry, wherein the display device further comprises a further plurality of connectors on a third side of the flexible substrate, the plurality of connectors being conductively coupled to the plurality of second conductors for connecting the second conductors of the display device to external control circuitry.

DaCosta teaches wherein the shift register comprises a first plurality of connectors for connecting the shift register to external control circuitry (fig. 3, fig. 7, also col. 12, line 37-46, shift register connected to external driver circuitry 104), wherein the display device further comprises a further plurality of connectors on a third side of the flexible substrate (col. 3, line 63-66, the disclosure allows for more than one integrated circuit structures to be attached to the substrate, see also col. 1, line 16-20, discussing scan and data lines and drivers formed on all sides of the substrate), the plurality of

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connectors being conductively coupled to the plurality of second conductors (col. 4, line 15-29, explaining how the technique is applicable to array circuitry) for connecting the second conductors of the display device to external control circuitry (col. 11, line 17-20, a separate connector could deliver signals from external driver circuitry directly to leads on substrate). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the shift register and plurality of connectors of DaCosta with the flexible display of Mach and Crone since such a modification would reduce external system complexity and cost, and reduce the risk of mechanical failure (DaCosta, col. 5, line 17-30).

Regarding claim 7, neither Mach nor Crone discloses wherein the display device further comprises a further flexible shift register for addressing the plurality of first conductors, the further flexible shift register comprising a plurality of further shift register cells, each further shift register cell being coupled to one of the first conductors, the further shift register being arranged in parallel with the shift register.

DaCosta teaches wherein the display device further comprises a further flexible shift register for addressing the plurality of first conductors (col. 3, line 63-66, the disclosure allows for more than one integrated circuit structures to be attached to the substrate, see also col. 4, line 15-29, explaining how the technique is applicable to array circuitry), the further flexible shift register comprising a plurality of further shift register cells (fig 7, also col. 12, line 51-52, the shift register circuitry provides Q control signals), each further shift register cell being coupled to one of the first conductors (figs. 6 and 7, shift register coupled to array circuitry via multiplexer circuitry), the further shift register

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being arranged in parallel with the shift register (col. 12, line 4-10, the shift registers provide signals in parallel). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the further shift register of DaCosta with the flexible display of Mach and Crone since such a modification would provide circuitry redundancy (DaCosta, col. 1, discussion of prior art involving redundant shift registers).

Regarding claim 8, this claim is rejected under the same rationale as claim 4.

Regarding claim 9, this claim is rejected under the same rationale as claim 5.

Regarding claim 10, this claim is rejected under the same rationale as claim 6.

Regarding claim 12, neither Mach nor Crone discloses an electronic device comprising: control circuitry for controlling a display device as claimed in claim 11; and a second further plurality of connectors coupled to the control circuitry, the second further plurality of connectors being arranged to interconnect the control circuitry to at least the first plurality of connectors and the further plurality of connectors.

DaCosta teaches an electronic device comprising: control circuitry for controlling a display device as claimed in claim 11 (same rationale as above regarding claim 11); and a second further plurality of connectors coupled to the control circuitry (col. 3, line 63-66, the disclosure allows for more than one integrated circuit structures to be

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attached to the substrate, see also col. 1, line 16-20, discussing scan and data lines and drivers formed on all sides of the substrate), the second further plurality of connectors being arranged to interconnect the control circuitry to at least the first plurality of connectors and the further plurality of connectors (fig. 3 and more specifically fig. 4, also col. 11, line 11-20, signal input circuitry (which includes the first plurality of connectors) is connected to control leads on the substrate (which includes the further plurality of connectors)). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the second further plurality of connectors of DaCosta with the flexible display of Mach and Crone since such a modification would reduce external system complexity and cost (DaCosta, col. 5, line 25-26).

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Krul et al. (US 6,830,192) discloses a substrate which is made from paper and is provided with at least one integrated circuit which is produced from a semiconductive organic polymer.

Kihara et al. (US 5,781,171) discloses a display substrate with redundant shift registers connected in parallel.

Roach (US 5,063,378) discloses a display substrate with redundant shift registers on opposite sides of said substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH CRAWLEY whose telephone number is (571)270-7616. The examiner can normally be reached on M-F, 7:30-5:00 EST, alternate Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Derris Banks can be reached on (571)272-4419. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEITH CRAWLEY/
Examiner, Art Unit 4193

/Derris H Banks/
Supervisory Patent Examiner, Art
Unit 3725

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